

REMARKS

In the July 25, 2007 Office Action, claims 1-9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,230,713 to Schauer in view of Applicants' Admitted Prior Art and further in view of U.S. Patent No. 6,032,359 to Carroll, and claim 10 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Schauer, Applicants' Admitted Prior Art, and Carroll, and further in view of U.S. Patent No. 5,735,697 to Muzslay.

By the present amendment, claims 1 and 6 are amended and claim 2 is canceled. Claims 1, and 3-10 remain pending in the application with claims 1 and 6 being independent. The rejections are respectfully traversed because none of the prior art, alone or in combination, discloses, teaches, suggests or renders obvious a flexible flat cable including (a) conductors printed onto one of its insulating layers, thereby defining a high density of conductors with respect to the pair of insulating layers, the high density of conductors including at least 15 conductors; and (b) a mounting header that has contacts attached to the ends of the conductors, the mounting header being received in a connection module of a housing of the clockspring for electrical connection to other components, as recited in the claimed invention. Each rejection is addressed in detail below.

Claim Rejections - 35 U.S.C. 103 for Claims 1-9

Claims 1-9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,230,713 to Schauer in view of U.S. Patent No. 6,032,359 to Carroll. A prima facie case of obvious has not been established because none of the cited prior art, either alone or in combination, teach or render obvious all of the claim limitations of independent claims 1 and 6, as amended.

a. "Printed" is a Structural Feature of the Claimed Invention that Must be Given Patentable Weight

Applicants again assert that the claimed invention structurally and positively recites printed conductors. Apparatus claims may recite either structural and/or functional features. See MPEP § 2114. Contrary to the Examiner's suggestion, independent claims 1 and 6 do not recite a method of printing conductors on an insulating layer. Instead, the claimed invention recites conductors printed onto the insulating layer. Therefore, the claim invention does not cover what the cable does but covers what the cable is, that is including conductors printed onto one of its insulating layers, as is permissible. Furthermore, the claimed invention distinguishes the prior art, such as Applicants' Admitted Prior Art, by its structure and not by its function. More specifically, the cable of Applicants' Admitted Prior Art includes conductors adhesively bonded to the insulating layers. In contrast, the claimed invention recites a cable which includes conductors printed on the insulating layer. Moreover, the claimed invention recites that conductive material resides on the interior surface of the insulating layer. That is unlike the cable of Applicants' Admitted Prior Art in which the conductors reside on an adhesive layer between the insulating layers and conductors. See page 3, lines 16-18 of Applicants' specification.

Accordingly, Applicants respectfully request that the claimed feature of "printed" be given patentable weight, or an explanation provided of how that feature is functional and inconsistent with § 2114 of the MPEP.

b. Conductors *Printed* Onto One of the Insulating Layers Defining a *High Density* of Conductors with Respect to the Pair of Insulating Layers, the High Density of Conductors including at least 15 Conductors not Taught or Rendered Obvious by the Prior Art

Schauer either alone or in combination with Carroll fails to teach or render obvious printed conductors that define a high density of conductors. As admitted in the Office Action, Schauer does not disclose printed conductors on an insulating layer of a flat cable.

Additionally, Schauer also does not disclose a high density of conductors, such as at least 15 conductors. Instead, Schauer discloses only a plurality of conductors 11 and at most 6 conductors 11, as described in col. 3, lines 17-18.

Carroll fails to cure the deficiencies of Schauer. The Examiner generally asserts that Carroll teaches that it is known to have conductors printed onto a substrate. Carroll, however, does not teach what is actually claimed. That is nothing in Carroll teaches or suggests conductors located between two insulating layers of a cable with conductors printed on one of those layers so that a thin layer conductor material resides on an interior surface of that layer, as recited in the claimed invention. Instead, Carroll is only a general teaching of a flexible circuit that includes a dielectric substrate with conductive inks printed on its surface to define circuit traces. But that is not what is claimed. The claimed invention calls for conductors printed on an insulating layer of a flexible cable not circuit traces on a rigid substrate. Furthermore, Carroll does not teach conductors printed on the insulating layer to define a high density of conductors, such as at least 15 conductors, as recited in amended claims 1 and 6.

The Examiner also suggests that it would have been obvious to substitute the conductors of Carroll which the Examiner alleges seem to be thinner than the conductors of Schauer and Applicants' admitted prior art to have a more flexible cable. See page 13, lines 7-12 of the Office Action. That argument is misplaced for two reasons. First, the teaching identified in Carroll is with respect to a *rigid* substrate, such as a circuit board. Therefore, Carroll could not teach more flexibility. Second, the Examiner also argued that Schauer specifically teaches that its conductors 11 are "particularly thin." Accordingly, it would not have been obvious to substitute the alleged thin printed conductors of Carroll for the "particularly thin" conductors 11 of Schauer since both types of conductors are thin, and thus would not result in a more flexible cable.

Regarding Applicants' admitted prior art, it is cited only for the general teaching of a flexible cable having a stripped end exposing its conductors. Nothing in Applicants' admitted prior art teaches printed conductors nor a high density of conductors, as recited in the claimed invention. Therefore, Applicants' admitted prior art also does not cure the deficiencies of Schauer.

c. Claimed Invention Satisfies A Long-Felt Need

Attached as Appendix A is Applicants' Declaration Under § 1.132 originally filed on May 1, 2007. The Declaration establishes that all three elements are satisfied, thereby overcoming the rejection under § 103.

On page 12, last paragraph of the Office Action, the Examiner indicates that the Declaration is not consistent with the claims. The Examiner interprets the Declaration as addressing the need to replace the current two cable system with a one cable system. Applicants agree with the Examiner in part, however, the Declaration more specifically addresses the need for a one cable system with a high density of conductors. Independent claims 1 and 6 are amended, therefore, to recite a high density of conductors (including at least 15 conductors) consistent with the Declaration.

Any alleged prima facie case of obvious of the claimed invention is overcome because the claimed invention satisfies a long-felt need. Each of the three elements for establishing a long-felt need is addressed below.

i. Element 1 - Need must have been a persistent one that was
recognized by one of ordinary skill in the art

As outlined in the Declaration, conventional clocksprings used in motor vehicles typically employ a small number of conductors: 5 conductors at the most; 2 for the airbag circuit and 3 for other steering wheel functions, e.g. horn and speed control. Automakers have increased the quantity of steering wheel mounted control devices to include controls for the audio system, transmission shifting, telephone, and the like. This trend greatly increased

circuit density requirements against a backdrop of continuous price reduction demands.

Thus, there has been a long-felt need for a single high circuit density cable for clocksprings to accommodate the increase in conductors and electrical conductors, as described above.

The flat cables used in commercial clocksprings have traditionally employed flat copper conductors laminated between two sheets of polymer film. Using conventional lamination methods, the lower limit of the width of the flat copper was restricted. Because the width of the cable was restricted by the maximum thickness of a clockspring assembly, an upper limit on the quantity of parallel conductors that could be laminated in a conventional flat cable was restricted.

ii. Element 2 - Need has not been satisfied by another

Prominent suppliers of clocksprings have attempted to solve this problem by use of two or more flat cables, thus allowing two or more times the amount of circuits to be used. See for example U.S. Patent No. 5,865,634 at col. 1, line 61- col. 2, line 2 and U.S. Patent No. 6,109,942 at col. 1, lines 41-43 and 62-64, which identify the problem of the need for increased circuit density and attempt to solve this problem by using two or more flat cables. Additionally, Furukawa Electric Company also manufactured and employed two flat cables with its clocksprings to address the increased circuit density need. Although use of two flat cables provides use of more conductors, the costs are doubled, and complexity and weight are added to the clocksprings. Moreover, the additional moving cables contribute to undesirable sound emanating from the as the clockspring as it is rotated.

iii. Element 3- Claimed invention in fact satisfies the need

The claimed invention satisfies the need for increased circuit density, at a low cost, in a flat cable. Specifically, each of independent claims 1 and 6 recite a flexible cable that include conductors spaced between a pair of insulating layers so that the conductors are printed onto one of the insulated layers so that a thin layer of conductive material resides on

an interior surface of one of the insulating layers. By printing the conductors on the interior surface of one of the insulating layers such that the conductive material resides on the interior surface, a much greater density of conductors is provided in the cable. Accordingly, only a single cable is required to meet the requirements of the recent control devices added by automakers, such as steering wheel mounted devices, audio system, transmission shifting, telephone, etc.

- d. A Mounting Header that has Contacts Attached to the Ends of the Conductors, the Mounting Header Being Received in a Connection Module of a Housing of the Clockspring for Electrical Connection to Other Components

Independent claims 1 and 6, as amended, recite a mounting header that has contacts attached to the ends of the conductors, the mounting header being received in a connection module of a housing of the clockspring for electrical connection to other components. None of the cited prior art teaches such a mounting header. Even assuming the contact holder 17 of Schauer could be considered a mounting header, as suggested in the Office Action, the contact holder 17 is not received in a connection module of a clockspring housing. Likewise, nothing in Applicants' admitted prior art or Carroll teaches a mounting header.

In view of the above, a prima facie of obviousness has not been established with respect to claims 1 and 6. In response to the Examiner's general assertion that Applicants are attacking the cited references individually when they were used in combination to reject the claims, Applicants note that a prima facie case of obviousness requires that all of the claim limitations be found in the prior art. Because all of the elements of the claimed invention are not found in any of the individual cited references, i.e. Schauer, Applicants admitted prior art, or Carroll, the combination cannot teach all of the claimed limitations. Thus, a prima facie case of obviousness has not been established. Accordingly, Applicants request reconsideration and withdrawal of the rejection of claims 1 and 6 under 35 U.S.C. §103(a).

Dependent claims 3-5 and 7-9 are also allowable for the same reasons. Moreover, these claims recite additional features not found in the prior art. With respect to dependent claims 4 and 8, the Examiner asserts that Schauer teaches soldering, as recited in those claims. However, the Examiner ignores the contradictory teaching of Carroll which has been combined with Schauer to reject those claims. In order to combine Carroll with Schauer, the solder connection taught by Schauer is eliminated by the teachings of Carroll. That is because Carroll specifically teaches putting cuts in substrates to provide a solderless connection.

Regarding dependent claims 5 and 9, the Examiner asserts that those claims do not recite a solder connection. However, claims 5 and 9 do recite that the contacts are *secured* to the circular apertures. Carroll teaches inserting pins through apertures; however Carroll does not teach securing the pins to the apertures.

Claim Rejections - 35 U.S.C. 103 for Claim 10

Claim 10 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Schauer, Applicants' Admitted Prior Art, and Carroll, and further in view of U.S. Patent No. 5,735,697 to Muzslay. Dependent claim 10 is allowable for the same reasons discussed above regarding independent claim 6. Claim 10 also recited recites that the mounting header is specifically located on an intermediate portion of the flat cable, and that the flat cable further includes two extensions having connectors on the ends thereof for attachment to airbag canisters, which is also not found in the cited prior art.


Muzslay does not teach a mounting header located on an intermediate portion, therefore a prima facie case of obviousness has not been established. If the connector of Muzslay is interpreted as a mounting header located in an intermediate portion, then portions

130F and 130Q cannot be characterized as extreme portions. Alternatively, if portions 130F and 130Q are interpreted as extensions, then the connector 12 A must be characterized as an extreme rather than an intermediate portion. Applicants respectfully request that the Examiner specifically address this inconsistency in Muzslay with the claimed invention.

In view of the foregoing, Claims 1, and 3-10 are believed to be in allowable condition. Prompt and favorable treatment is respectfully solicited.

Please charge any shortage of fees or credit any overpayment thereof to BLANK ROME LLP, Deposit Account No. 23-2185 (115584-00343). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this report, Applicants hereby petition under 37 C.F.R. §1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized above.

Respectfully submitted,


Tara L. Laster
Reg. No. 46,510

BLANK ROME LLP
600 New Hampshire Avenue
Washington, D.C. 20037
Telephone: (202) 772-5800
Facsimile: (202) 772-5858

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APPENDIX A